

Team Las Vegas Resilience Narrative



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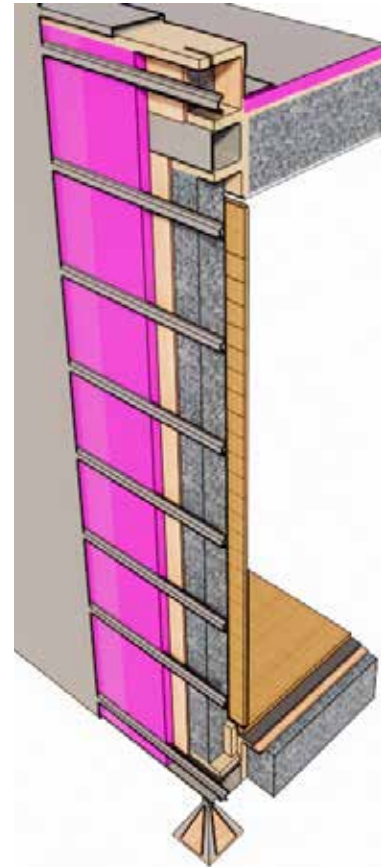
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Durability

To what level do the building design details, materials selection, and construction practices ensure durability of all building science control layers (thermal, air, bulk moisture, and moisture vapor)?

We designed an air-tight home to prevent wasteful energy loss. Good envelope enclosure minimizes the need to later compensate with energy dependent mechanical systems. The thickened walls provide deep insulation, helping prevent heat gain/loss through the building envelope and create a barrier against exterior noise that may trigger PTSD. The exterior finishes will never need painting and all materials used reduce the need for maintenance.

We wrapped the building envelope with highly sophisticated and durable materials to achieve high performing energy ratings.



Materials consist of:

- 2" Polyiso Rigid Insulation
- 11 1/4" Closed Cell Insulation
- HSS 6X6X1/4
- 2" Polyiso Rigid Insulation
- 22 GA. Flat Seam Siding
- 1/2" Gypsum Board
- 4/4 Tongue and Groove Ash Wood Planks
- 7/8" Hat Channel at 16" O.C.
- 1/2" Structural Plywood

Durability

To what extent is the house, through both design and materials, durable and able to resist extreme environmental conditions?

The extreme heat, dryness, and plentiful sunshine of the Mojave Desert damages most conventional building materials over time, requiring homeowners to paint or replace materials regularly. Our exterior cladding is a rain screen made with galvanized steel. Not only will this material age gracefully, requiring minimal upkeep, but it will also reflect the many colors of our celebrated desert sunrises and sunsets. In addition, the green wall and operational green gate add a layer of protection from the prevailing winds of Nevada. It helps mitigate winds, essentially acting as another barrier that can stand up to intense wind and sun on the south side.

How well does the design optimize or address longevity of design, including maintenance, material performance, life cycle costs, and owner operation?

All interior finishes and materials were consciously chosen to help maximize the house's potential. The operable window walls that separate the bedroom and living spaces are designed as a way of expanding the living spaces into the outdoor volume, as well as an act of empowerment for the user, a catalyst for the healing act of controlling one's environment. This ability to manipulate space allows the resident to shift their home to meet their needs, while also adapting to the weather conditions of the Las Vegas Valley. The controls of the solar thermal system can be housed in a compact, insulated box. This minimizes space, makes components easily serviceable, and simplifies installation and connections.

Performance



To what extent does the building design approach for the specified location enable the building to withstand and recover from potential disasters because of risks posed by weather and other natural or man-made events?

This house turns inward, sheltering the resident from heat and noise, and achieving a model of alfresco living, otherwise unattainable in the southern Nevada climate. Our chosen plants can thrive in our environment and will provide the calm and healing atmosphere of the outdoors, as well as be extremely easy to care for with their minimal watering needs. Mojave Bloom

strategically reallocates and partitions the system to take advantage of greywater reuse from the shower, laundry, and irrigation lines to be recycled for toilet flushing and irrigation. The irrigation and recirculation of water will require little energy as the selected plant materials can sustain themselves on a low emitter drip system that once pumped to an appropriate height, can be gravity fed into high absorption growing media to prolong water residency. To achieve a net-zero energy home, Sol-Up installed and provided the roof-mounted photovoltaic (PV)

Performance

system. This includes 16 400-watt, bifacial panels. The photovoltaic system powers the home during daylight hours and charges the Tesla batteries for night operation. Two Tesla batteries are used for backup power and peak power reduction.

To what extent does the house provide occupants critical load capabilities, including the ability to operate during an extended power and water outage through energy efficiency designs, on-site generation, on-site storage with islanding capabilities, and critical load considerations?

The systems of the home are designed to be able to continue to function efficiently in the event of an outage through on site-generation and load sharing capabilities. In the event of an outage, the systems of the home can be controlled to shed load or load share, thus reducing the

load on the batteries and the demand from the grid. For cooling, dehumidification, and secondary heat the home will use efficient Mitsubishi Electric mini-split heat pumps. Two units will be used that can operate independently for reduced energy load and system redundancy. The solar thermal system heats the water for domestic hot water and radiant heating via the use of an evacuated tube solar thermal collector. Large domestic hot water demands from systems such as shower and laundry are placed near the solar thermal storage system to decrease water and energy loss. Furthermore, the Phase Change Material plenum enables the make up air system to bring 78 degree air into the house year-round, dramatically reducing heating and cooling loads.



Resource Management

To what extent does the team holistically integrate passive strategies, materials selection, life cycle, and local strategies to maximize resilience?

Originally designed as a healing place for war veterans, Mojave Bloom also offers a safe place for other PTSD and TBI victims. Mojave Bloom holistically incorporates many passive strategies that maximizes resilience. The design is inspired by traditional Islamic sahn with a courtyard featuring a hydroponic living green wall within the home. The courtyard and green wall system delivers the user a new sense of power from simply allowing them to control their environment, as a beneficial catalyst for healing. Hence, the operable door and thermally treated wood louvers allow the user to alter their space according to their needs. Beyond the visual stimulation the greenspace offers, the user is

immersed with a slight aroma of fresh herbs and the calm sound of trickling water.

To what extent does the competition prototype enable the reclamation and reuse of water utilized by the house?

In recent years, drought conditions are affecting not only our crops but also our city's livability. Our design emerges in thinking how we can survive during more severe drought seasons or in a case that communications with the rest of the country is shut down. Las Vegas' climate is not conducive to strictly rely on rainwater as an alternative supply of water but must also strategically reallocate and partition the system to take advantage of grey water reuse from the shower, laundry and irrigation lines to be recycled for toilet flushing and re-irrigation practices. The irrigation and recirculation of water will

Resource Management

require little energy as the select plant materials can sustain themselves on a low emitter drip system that once pumped to an appropriate height, can be gravity fed into high absorption growing media to prolong water residency. The selected plant materials will also require little irrigation with a staggered water schedule so that energy for the pump system can be minimal.

been designed for optional energy usage and savings, while performing better than the average home. After calculating the usage and power consumption of devices that use electricity, the annual energy consumption is 4,123 kWh. This value is a third of the annual energy production at 12,071 kWh with the help of the photovoltaic system, according to the System Advisory Model.

To what extent is the competition prototype house expected to require less energy than a comparable minimally code-compliant building?

With the use of BEopt, an energy modeling software, and the current design parameters of Mojave Bloom, the output of Home Energy Rating System is a score of 30.2. This indicates that the design consumes 30.2% of energy comparable to a conventional, code-built home. Mojave Bloom has



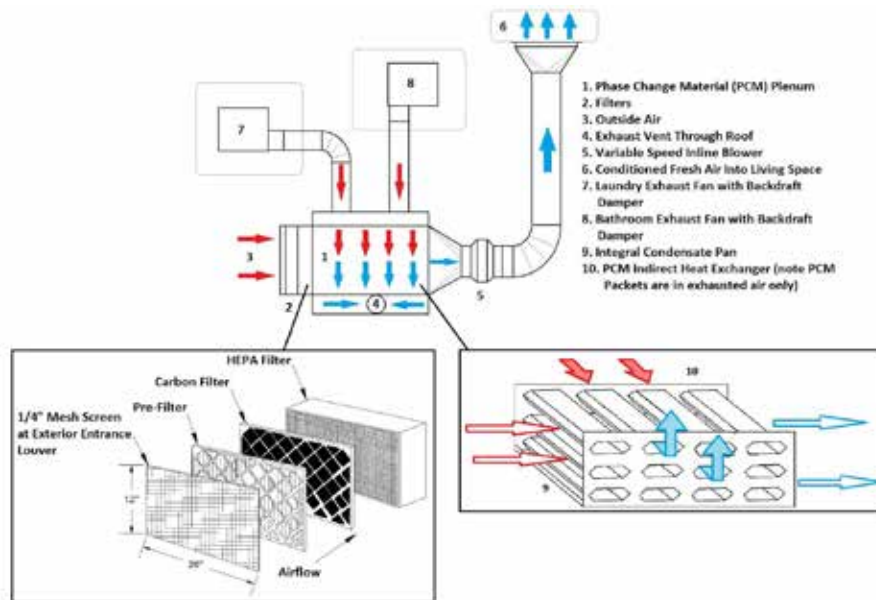
Resilience Innovation

To what extent did the team take unique or innovative approaches to building resilience and occupant safety throughout the design process and implementation?

Mojave Bloom incorporates aspects of home automation to provide building resilience and occupant safety. During periods of power outage or a utility Demand Response event, the systems of the home can be controlled to shed load or load share to reduce the load on the batteries or to reduce the demand from the grid. Controls of the solar thermal system are integrated into the home automation system, so that the solar thermal system becomes the primary source for hot water and heating. Temperature measurements of the solar thermal collector, solar thermal storage tank, and hot water circulation pump are taken using Smartenit's Input/Output Controller. The

fully integrated heating, venting, and air conditioning system will use the home automation system to monitor ambient and home conditions to better select modes of operation. Intellinet donated accessories for the ethernet, cable, and CAT wiring. The Insteon Hub is connected to the TP-Link Router and allows the occupants of the home to use voice command to control any device in the home. With the help of integrative software such as Mobile Integrated Solutions' Mobilinc app, users can control systems using their smart device. Global Cache's infrared transceiver allows devices such as the mini-split heat pumps, ceiling fans, television, and the DVD player to be controlled through infrared signals.

Resilience Innovation



How well does the team use resilient design to improve house performance and occupant health?

In Mojave Bloom we incorporate the use of the innovative Phase Change Material (PCM) plenum energy recovery system that is able to provide filtered, ambient fresh air that gets vented through the home and also energy efficient fans. The PCM is composed of encapsulated, eutectic salt that melts at high ambient temperature and absorbs heat from incoming air. Carbon

and HEPA filters will be used to remove odors, allergens, and small particles from fresh air. In-line fan blows filtered and conditioned fresh air through directional vent both in the bedroom and down the hallway to provide clean, fresh air to the entire home. The humidifiers will humidify the air as needed. All these elements improve house performance and occupant health while adding to the resilient design of the house.